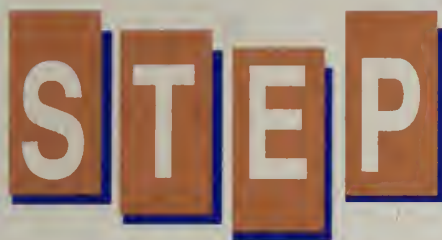


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THE MASSACHUSETTS STRATEGIC ENVIROTECHNOLOGY PARTNERSHIP



# 1996 Annual Report

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**Executive Office  
of Environmental  
Affairs**

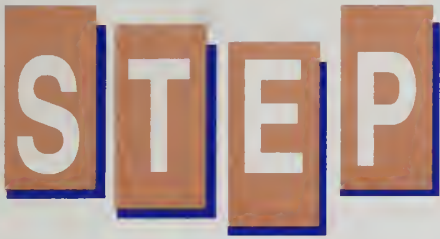
**Department of  
Economic  
Development**

**University of  
Massachusetts**



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# **1996 Annual Report**

**Executive Office  
of Environmental  
Affairs**

**Department of  
Economic  
Development**

**University of  
Massachusetts**



March, 1997

### To the People of the Commonwealth

We are pleased to report to you on the second year of operation of STEP - the Strategic Envirotechnology Partnership. This is a unique and exciting partnership among three key agencies of Massachusetts state government - the Executive Office of Environmental Affairs, the Department of Economic Development and the University of Massachusetts.

The Massachusetts environmental industry represents one of the largest accumulations of technical, engineering and manufacturing skills in the world. It already generates over \$6.7 billion annually for our economy and employs 55,000. Environmental problems are becoming pressing in the rapidly developing economies of the world. It is not hard to envision that tomorrow's businesses will increasingly be selling solutions to the world's environmental problems.

The road to commercialization of new environmental solutions is, however, often too long and arduous. A decade of research and development and the expenditure of tens of millions of dollars in funds from various sources are often required. Such activity must take place in an uncertain regulatory environment and investment climate.

Massachusetts has chosen a unique approach to assist firms in expediting the commercialization process for environmental technology. We have made cooperation between government, industry and universities a vehicle for achieving more rapid commercialization of innovative technologies.

This year's annual report is filled with examples of how partnerships are speeding environmental solutions from idea development to commercial sales. The report reveals how we are examining - and where necessary, changing - key regulatory programs to promote innovation; partnering with manufacturers to demonstrate cleaner technology; assisting start-up companies to move from the technical to commercial stages of their development; and playing a leadership role nationally in environmental technology cooperation.

If one measure of success is the degree to which Massachusetts companies value our efforts, then we are especially pleased to note that outside support is approaching the appropriation from the legislature. In the years ahead, we expect to be able to report even more progress towards our goal of making Massachusetts a leader in selling solutions to the world's environmental problems.

William M Bulger  
President  
University of  
Massachusetts



Trudy Cox  
Secretary  
Executive Office of  
Environmental Affairs

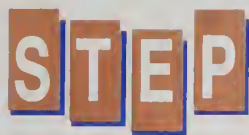


David A. Tibbets  
Director  
Department of  
Economic Development



Commonwealth of Massachusetts  
Department of Economic Development





## Background

In 1993, the Massachusetts Legislature created the Forum for Innovative and Alternative Technologies (the Forum) to evaluate means of supporting the development of innovative envirotechnologies. Chaired by the Secretary of Environmental Affairs, the Forum concluded that, while devoting more resources to research and development is helpful, government and industry also must cooperate to solve the excessive uncertainty faced by private investors.

Although environmental regulations have spurred the demand for new technologies, regulations and regulatory processes can also act as a barrier to technology demonstration. In addition, the fact that regulatory requirements change causes uncertainty on the part of users and regulators and leads to a pervasive reluctance to take risks on even well researched technologies.

The STRategic Envirotechnology Partnership (STEP) — the cornerstone of the Forum's recommendations — offers a full range of coordinated state services to reduce the uncertainties associated with envirotechnologies at each stage of technology and business development:

- **Applied Research and Development**

Process or product improvements through partnerships with research and development centers located throughout the many campuses of the University of Massachusetts (UMass).

- **Technology Assessment**

Verification of the cost and performance of the technology.

- **Business Support**

Assistance to identify potential markets and tap potential sources of public, quasi-public and private financing.

- **Technology Demonstration**

STEP-supported demonstrations serve a dual purpose: to assist innovators by providing low risk opportunities to fully test and demonstrate a technology, and to provide the state with cost effective remediation or other technology improvements.

- **Regulatory Assistance and Expedited Permitting**

Clarification of regulatory issues, facilitation of permit reviews, and identification of opportunities to use innovative technologies, are offered by the staff of the Department of Environmental Protection.

- **Access to Markets**

Assistance in reaching markets via an interstate reciprocity agreement with California, New Jersey, Illinois, Pennsylvania, and New York. In addition, many state agencies are changing their purchasing practices to reflect new environmentally-driven procurement practices. STEP also assists companies in gaining access to international markets.

## STEP

## 1996 Highlights

In 1996, sixty-eight environmental and energy technology companies received assistance.

- **Ion Signature Technology, Inc.**, Concord, MA, received a commitment of funds from investors for commercializing its ion fingerprint software technology, which quickly identifies pollutants in soil. UMass Boston's Environmental Business and Technology Center assisted the company to develop their business strategy, revise and expand their prospectus, and develop a plan to raise the capital required.

- Billerica-based **Solmetex** and its technology, Keyle:X is in the final stage of testing. So far, data collected suggests the technology's ability to consistently remove mercury to Massachusetts Water Resources Authority (MWRA) discharge limits, according to testing completed by UMass Boston's Environmental Business and Technology Center and UMass Lowell's Center for Environmentally Appropriate Materials. With this critical step completed, Solmetex received a letter of support from the Massachusetts Environmental Affairs Secretary.

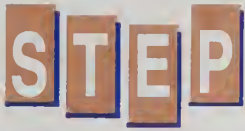
- **AirXpert Systems**, Lexington, MA and **AWT Bioclere**, New Bedford, MA were advanced by Massachusetts for interstate permitting of innovative technologies. The Executive Office of Environmental Affairs received the White House Hammer Award in recognition of its cooperative efforts through this six-state agreement under which each of the states will accept the environmental and performance data developed in another state, where the intent is to move the states towards reciprocity.

- Thirteen new applied research and development partnerships were established with Massachusetts companies to develop and demonstrate process technology for cleaner manufacturing. These include **Chem Design**, Fitchburg, MA; **Polaroid**, Waltham, MA; and **Globe Manufacturing Company**, Fall River, MA. The industrial partners have contributed over \$450,000 in matching funds.

- The Chelsea Center for Recycling and Economic Development at UMass Lowell assisted three companies, **Recycline**, Cambridge, MA, **Shetech**, Haverhill, MA, and **GT Machine**, Boxford, MA in converting from virgin plastic resin to recycled plastic.

- **Cellini Purification Systems**, Ludlow, MA was assisted by the Department of Environmental Protection in obtaining a determination from EPA Region 1 that its CAST® system meets the federal definition of totally-enclosed treatment and can be exempted from difficult federal permitting requirements.

- **Brittany Dyeing and Printing Corp.**, New Bedford, MA and **ThermoTrex**, Waltham, MA received grants from the U.S. Department of Energy under the National Industrial Competitiveness through Energy, Environmental and Economics program. The Office of Technical Assistance in EOE and the Division of Energy Resources in the Department of Economic Development were instrumental in developing these proposals. Through the efforts of STEP, over \$1,000,000 in outside funding was received by individual companies and agencies.



## Executive Office of Environmental Affairs

### Department of Economic Development

One of the recurring themes of the Weld-Cellucci administration has been that economic development and environmental protection are not mutually exclusive; in fact they can and do work hand-in-hand. This synergy is nowhere more clearly demonstrated than in our local environmental industry.

Massachusetts can take pride in this excellence, which the state has helped to cultivate. We recognize, however, that we must continue to offer services that will keep the envirotech industry strong.

The Department of Economic Development oversees the business assistance and development aspects of the STEP program. This is a critical role to create technology companies that can compete not only in Massachusetts but also across the United States and globally. Direct interaction with STEP companies is handled by the Massachusetts Office of Business Development (MOBD). MOBD reviews each STEP applicant's business plan to ensure that the technology is potentially viable, to identify areas in the plan that can be improved and to identify appropriate assistance, including business planning, financing, training and recruiting.

The Division of Energy Resources (DOER) supports STEP with direct funding of technology assessment and research projects at the Energy Analysis and Diagnostic Center (EADC) at UMass Amherst (see page nine for additional information). In 1996, DOER

provided approximately \$200,000 to review and support 22 companies. Additionally, both DOER and EADC play a critical role in all the STEP reviews by examining the energy impacts of the innovative technologies.

The Executive Office of Environmental Affairs coordinates the implementation of the STEP initiative, develops the state purchasing and technology demonstration program and identifies environmental priorities for the Commonwealth.

Accomplishments in 1996 include:

#### **Technology Demonstration Support**

EOEA and its agencies helped developers gain access to state owned demonstration sites and provide important regulatory and technical input into the design of the demonstration work plan. EOEA's input ensures that all the technical, environmental and regulatory issues are identified and addressed before the demonstration begins. This process assures better transferability of the data. Examples include:

- **AirXpert Systems**, Lexington, MA
- **Bluestar Technologies**, Newton, MA
- **Guardian**, Kent, CT
- **KAI**, Northampton, MA
- **ORS/Sippican**, Fairhaven, MA
- **SolmeteX**, Billerica, MA
- **Thermatrix Inc.**, San Jose, CA
- **Tougher Industries**, Albany, NY



## STEP

### Massachusetts Water Resource Authority (MWRA) Mercury Project

For two years, EOE's Office of Technical Assistance for Toxics Use Reduction (OTA) has played a major role in the Mercury Workgroup organized by the MWRA which includes a group of 28 hospitals in the Greater Boston area. The purpose of the Workgroup is to assist in reducing or eliminating the use of mercury and thereby reduce the loadings to the MWRA system. Phase One identified all sources of mercury.

Phase Two will focus on corrective action, including the writing of procedures and a management handbook for hospitals as well as testing of a number of mercury removal technologies. OTA staff is involved in the assistance provided by STEP to MWRA in designing the bench testing program, and also will be involved in the subsequent pilot testing of selected technologies.

### Zero Discharge Regulations

Zero discharge technologies separate and recycle process line wastewater, thus reducing discharges and amounts of hazardous waste generated. EPA Region I has concurred with the Department of Environmental Protection (DEP)'s determination that the CAST<sup>®</sup> system of **Cellini Purification Systems**, Ludlow, MA, meets the federal definition of totally-enclosed treatment and can be exempted from difficult RCRA permitting requirements.

### Field Screening Technologies

Immunoassays and other field technologies, which can assist in faster and cheaper site cleanups, are often limited by perceived requirements that

all site testing be done by certified laboratories. Working with **Urban Contamination**, Newton, MA, DEP staff issued a department wide clarification that state regulations do not require the use of certified laboratories for soil testing. Training is underway for DEP site managers and outside consultants on the appropriate use of screening technologies.

### Refuse-Derived Fuel

DEP regulations encourage the recycling of waste materials whenever possible, and do not consider combustion of fuel as a recycling technology. By highlighting the impact of these regulations on the production and use of biodiesel fuel from waste grease, the STEP process has led DEP staff to reexamine and clarify its policies that balance the goals of maximum recycling and protection of environmental quality.

### On-Site Bioremediation

After a one-year pilot program to study the impact on groundwater quality of the products used in on-site bioremediation of hydrocarbons, DEP completed regulatory changes to allow the use of this technology without a groundwater discharge permit.

### Analytical Methods

Potential mercury analysis and laboratory reporting inconsistencies were discovered during the STEP / **SolmeteX** / Boston University demonstration project. The purpose of the demonstration project was to evaluate the KeyLeX technology and its ability to meet MWRA mercury discharge standards (1ppb). During the study, samples from the field trials were analyzed by three separate laboratories. In all cases where EPA approved



# STEP

protocols were used, values poorly compared to UMass Boston laboratories using more advanced methods. As a result, STEP began discussions on these methodology issues with the MWRA and EPA Region 1.

## State Procurement of Environmentally Preferred Products

One of the most unique features of STEP is its stated intent to move sound, cost-effective technologies into state purchasing. EOEA developed a work plan designed to integrate STEP activities with the environmental preferred products efforts underway at Operational Service Division (OSD), the Commonwealth's lead procurement agency. EOEA also developed a standard STEP vendor package for distribution.

Mass Highways is currently developing an innovative technologies policy statement. Mass Highways also agreed to jointly sponsor with EOEA a STEP technical seminar for the Department's engineering staff, their subcontractors and other sister agencies.

STEP jointly sponsored with the Clean States Initiative a technical conference held at the UMass Medical Center. **AirXpert**, Lexington, MA, and **Environmental Management Technologies (EMT)**, Milton, MA, were presented to about twenty state facility operators. This event helped EMT connect with a potential sales opportunity at a public university.

In addition, STEP hosted a vendor's conference for field assessment technology companies in which six companies made presentations to an

audience of potential customers. Four of the presenting companies reported that they had solid leads as a result of the conference.

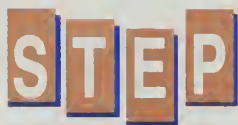
## Access to Interstate Markets

STEP wrote several letters of introduction to agency officials sharing the results of STEP evaluations to speed up the transfer of good technologies. For **SolmeteX**, Billerica, MA, this introductory letter translated into a meeting with high ranking California environmental officials. SolmeteX was able to connect with several potential California remediation opportunities.

A New Jersey introduction for **AirXpert**, Lexington, MA, led to an invitation to participate in a high profile public event. California also agreed to have the STEP report reviewed internally in order to determine AirXpert's best California connection.

The goal of the New England Interstate Regulatory Cooperation (IRC) Project is to promote the acceptance of innovative environmental technologies in New England. Partners include regulatory agencies in all six New England states, EPA Region I's Center for Environmental Industry and Technology, New England Governors' Conference, and New England Interstate Water Pollution Control Commission (NEIWPCC).

In 1996, the IRC began a 12-month evaluation of innovative on-site wastewater disposal technologies. Each state will continue to make final permitting decisions, but it is expected that joint evaluation will result in faster permitting decisions. DEP staff participate in the project's steering committee.



## Six-State Agreement Received White House Award

Massachusetts signed a landmark agreement with California, New Jersey, Illinois, New York and Pennsylvania to promote the envirotech industry by developing a cross state technology review and approval program. Through this new interstate agreement, we have greatly expanded the reach of STEP efforts and the opportunities available to developers and users of environmental technologies. Two STEP technologies, AWT Bioclere and Cellini, are going to be reviewed and permitted (where appropriate) in the other five states. The National Governors' Association (NGA) is providing \$150,000 in EPA funding to assist us in this interstate pilot program.

Through the MOU, AirXpert, a STEP evaluated and demonstrated technology, has been referred to New Jersey as the first technology to be evaluated by the New Jersey Corporation for Advanced Technologies. Teams of New York permittees have come to Massachusetts to view a demonstration of a new innovative wastewater treatment technology and to hear about DEP's permitting experience. Another STEP evaluated technology, SolmeteX, was introduced to MOU contacts in California and was able to quickly connect with several potential California marketing opportunities in the remediation arena.

Over the past year, with the support of the Department of Energy (DOE), the six states have: shared information on new technologies recently approved or under review to encourage cross state technology transfer and to expedite permitting, and negotiated a detailed workplan to accelerate this interstate effort. Additionally, the DOE has participated in the program by promoting the certified technologies in states other than the six partners.

The White House has issued its 1996 Hammer Award to the six states and the DOE in recognition of their cooperative program. This award acknowledges efforts that develop innovative approaches for overcoming bureaucratic barriers to technological progress.

# STEP

## University of Massachusetts

To provide a comprehensive array of research, testing and technical assistance services to STEP, the University of Massachusetts was appropriated \$1.5 million by the Massachusetts Legislature as part of the UMass budget.

The University has taken a system-wide approach to its role in STEP. It has harnessed the talent of faculty and staff on four of its campuses to work on STEP. The accomplishments of the centers on each campuses include:

### UMass Amherst

The National Environmental Technology for Waste Prevention Institute (NETI) serves as a vehicle enabling pollution prevention research to be collaboratively sponsored and performed by project teams consisting of the UMass Amherst researchers and technical representatives from industrial companies. NETI also serves as the catalyst for technology transfer and cost-effective commercialization of NETI's pollution prevention research projects.

In 1996, NETI contributed \$435,000 in state funding and NETI industrial partners are contributing \$458,000, to nine applied research projects. In this way, the state funding to support pollution prevention research has been more than matched by NETI's industrial partners.

Among some of the projects at NETI:

- **Recycle of VOCs in Chemical Processes: the Use of Molecular Sieves and the Potential for Microwave Radiation to Enhance Sorption and Recycle**

**Industry Partner: ChemDesign, Fitchburg, MA**

Researchers continue to evaluate the design of selective (molecular sieve) adsorbents and the energy required for desorption to selectively recycle and recapture specific VOCs (the major pollutants in power, petrochemical, and material industries) from process stream or plant atmospheres. With a second year of NETI funding, the researchers are conducting plant-scale tests on plant effluents at the site of industrial partner, ChemDesign Corporation. Discussion are underway to include other Massachusetts companies in this research project.

- **Design and Optimization of Batch Solvent Recovery Processes for Waste Prevention**

**Industry Partner: Polaroid Corporation, Waltham, MA**

This researchers are testing methods already developed for the scheduling of batch chemical operations to reduce waste in industrial operations. Using these methods, the research is focused on determining the operational policies for batch distillation to further reduce waste by reprocessing more contaminated solvents for re-use rather than disposal. Such problems are generic to industries such as speciality chemicals, speciality materials, and pharmaceuticals. Testing is being carried out in cooperation with industry partner, Polaroid Corporation.

- **Kinetics for Controlling NOx at the Source**

**Industry Partner: United Technologies Research Center, East Hartford, CT**



# STEP

This project focuses on developing improved kinetics for predicting NO<sub>x</sub> formation and destruction in power generation, both in furnaces and in turbines. The goal is to reduce emission by designing and modifying combustion processes and equipment. The researchers are refining and developing thermochemistry and kinetics using *ab initio* computation chemistry, quantum reaction theories, and mechanism reduction techniques; and, then predicting flame structures and testing against data. Deliverables will be Chemkin-format kinetics for use in design and emission codes.

The Energy Analysis and Diagnostic Center (EADC) at UMass Amherst is under contract with the Massachusetts Division of Energy Resources (DOER) to provide technology assessment services to STEP for energy-related technologies. The EADC is responsible for participation in demonstration projects and additional in-depth assessments.

The EADC uses in-house professionals and graduate students, as well as professionals from around the country that are recognized for their expertise, to provide technology services needed for the STEP program.

In the past year, EADC has had a pivotal role in the assessments of eight innovative technologies:

- **AIRxpert Systems**, Lexington, MA, manufactures a microprocessor based air monitoring and HVAC control system. A technology demonstration was conducted by EADC at UMass Boston.

- **BlueStar Technologies**, Newton, MA, manufactures Petrocat, a patented catalytic fuel conditioning device which

claims to increase fuel efficiency and reduce emissions. EADC recommended no further action on Petrocat, since no evidence of its effectiveness was discernible from the available technical data.

- **Energy Transition Technology, Inc.**, North Andover, MA, has developed a low-cost gas turbine engine that should operate efficiently using landfill gas. The STEP recommendation for field testing the engine is being investigated by EADC.

- **Environmental Management Technologies**, Milton, MA, had developed a microprocessor-based system for maintaining and analyzing underground storage tank information. STEP findings support advancement of the technology with minor enhancements.

- **Filter Clean**, Boston, MA, has developed a "dry" cleaning process which clean intake air filters used on diesel engines. Further tests were recommended by EADC to determine actual longevity of clean filters.

- **Second Wind**, Somerville, MA, has developed a power monitoring tool for electrical utilities and users of three-phase power. Further information is forthcoming on the performance of this device.

- **Thermatrix Inc.**, San Jose, California, has developed a flameless thermal oxidizer used for destruction of VOCs and halogenated hydrocarbons. EADC has recommended pilot scale testing at Massachusetts landfill.

- **Twin Rivers Technologies**, Quincy, MA, manufactures an alternative fuel known as biodiesel, which can be produced from blended diesel and vegetable oils. STEP is currently comparing emissions and fuel efficiency of the fuel with other alternative fuels.



## STEP

## UMass Boston

The Environmental Business and Technology Center (EBTC), established in 1995 and located in the College of Management at the University of Massachusetts Boston, has a dual mission of providing technology verification and business strategy support to Massachusetts technology companies.

As part of STEP, the EBTC has the lead in working with the other campuses within the UMass system to arrange testing, monitoring and business planning for early-stage technology companies seeking assistance. The EBTC then coordinates the analysis of the technology and business. If the technologies demonstrate significant environmental and economic impact, the EBTC provides more extensive assistance.

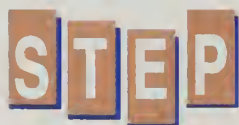
In 1996, 13 companies received technical assistance from the EBTC: **AirXpert Systems**, Lexington, MA; **Ariaon Technologies**, Cambridge, MA; **Cellini Purification Systems**, Ludlow, MA; **Energy Transition Technology**, Milton, MA; **Erickson Matis**, Winthrop, MA; **Ion Signature Technology**, Concord, MA; **Oil Recovery Systems**, Fairhaven, MA; **Second Wind**, Somerville, MA; **SolmeteX**, Billerica, MA; **Thermatrix**, San Jose, CA; **Twin Rivers**, Quincy, MA; and **Urban Contamination**, Newton, MA.

An important goal of the EBTC in 1996 was to begin to provide business assistance as well as technology assistance to Massachusetts companies. Recognizing the cavernous gap new companies face during the period between product development and market acceptance, the EBTC began

working intensively with **AirXpert Systems**, Lexington, MA, **Ion Signature Technology**, Concord, MA and **SolmeteX**, Billerica, MA, to revise their business plans to attract the necessary capital to begin implementing their business strategy.

In 1996, the EBTC began publishing, *Massachusetts Environmental Ventures*, a quarterly STEP business newsletter. This publication highlights important new environmental technologies — exciting R&D partnerships between industry and universities, creative new approaches to technology regulation, demonstration and testing, innovative domestic and international marketing efforts, and much more about the environmental technology business in Massachusetts. This newsletter assists over 4,000 Massachusetts businesses reach companies that can provide solutions to environmental problems.

The EBTC also co-sponsored *Envirotech Online*, which kept its 791 business and government subscribers up to date on market trends, regulations, and export opportunities. *Envirotech On-Line* was selected in 1996 by the Montreal-based Commission for Environmental Cooperation to be the US component in a Canada, US and Mexico North American Environment Technology Information Service. This service, which will disseminate information on environmental technologies and services, will help both the public and private sectors to make environmentally and economically sound choices when investing in new technology. This service will also help environmental technology suppliers in Massachusetts increase sales — not just throughout North America, but also to Central and South America.



## UMass Dartmouth

During 1996, the Dartmouth campus supported the STEP program with technical assistance for several industrial companies. In consort with industrial partners, research and development projects were undertaken.

Technology assessments were initiated and completed for three companies: **Bell Sea Marine System's** Vessel Efficiency & Fuel Optimization System in Holbrook, MA; **TMSR's** OXYOZONE Biosolids Treatment System in Lenox, MA; and **ORS/Sippican's** CHEMSENSOR technology in Fairhaven, MA.

In addition, various research and development projects were initiated, which will continue into calendar year 1997, a testimony to the strong viability and success of the working relationships that have been established with industrial partners. STEP-initiated research and development projects include:

- **Long Pond Eutrophication Study**

Working with the Long Pond Homeowner's Association and the Department of Environmental Protection, this research project was initiated to identify the cause of "non-native" plant blooms in Long Pond. The topic of invasive plants and the position of Long Pond in the New Bedford drinking water watershed stimulated interest from DEP. This study is identifying the types of plants that are blooming, as well as the most likely cause of the problem. In addition, a review of applicable mitigation and treatment alternatives is included. The outcome, expected in the next several months, will assist the DEP in its response to similar situations across Massachusetts.

- **STEP Beauty Parlor Wastewater Project**

This research project is in response to a state request by the DEP for the quantification of the effects of concentrated beauty parlor wastes on Title 5-regulated wastewater systems.

The project's primary objective is the formation of a body of knowledge which will eventually allow the Commonwealth of Massachusetts' environmental regulatory agencies to make considered and educated decisions about the discharge and/or treatment of the beauty parlor industry waste products. The potential ramifications of this project are significant, with the Massachusetts beauty parlor participant representing some 120 independent beauty salon operations in Southeastern Massachusetts alone. Beauty salon products manufacturers on the project team are being led by national environmental directors at **Clairol**, Stanford, CT, and **Helene Curtis**, Rolling Meadows, IL. It is expected this research will be useful in similar environmental regulatory situations throughout the United States.

- **Chemsensor and Accusensor Projects**

**ORS Environmental Systems**, a division of Sippican, Inc. has developed an innovative field-portable volatile, organic compounds (VOC) analytical technology called the Chemsensor, intended to compete against both alternative field-based technologies on the basis of ruggedness and reliability, and against stationary laboratory based instrumentation on the basis of speed and cost-effectiveness. Acceptance and widened use of field-based VOC analytical instrumentation are expected by government

# STEP

regulators, both regionally and nationally. The Chemsensor's use as a field monitor and screen tool anticipates this market shift.

A STEP final technical assessment was completed, and additional STEP support for ORS' technology development was recommended. This led to field testing of a variant ORS product, Accusensor, a field portable device capable of measuring trichloroethylene (TCE) in groundwater.

## UMass Lowell

The STEP Program at UMass Lowell provides funding for technical assistance, research and development projects through the University's Center for Environmentally Appropriate Materials and the establishment of the Chelsea Center for Recycling and Economic Development (formerly the Chelsea Center for Materials Reuse). The Chelsea Center helps Massachusetts reach its goal of recycling 46% of its waste by the year 2000.

Among project highlights for 1996 include:

- **Assessment of Recycled Products Manufacturing**

In order to assess the level of scrap-based manufacturing in Massachusetts, the Chelsea Center conducted a survey of "scrap-based" manufacturers. The Directory of Recycled Products Manufacturers, published in May, 1996, raised the visibility of manufacturing with recyclables and helped stimulate demand for these products and materials collected through recycling programs.

- **Intern Program**

The Chelsea Center in partnership with the Environmental Business and Technology Center at UMass Boston, created ReTERN, a recycling internship program. Four interns were placed for the Fall 1996 semester: as a learning process for participating companies: **Funn and Frolic**, Edgartown, MA; **The Institute for Self Active Education**, Jamaica Plain, MA; **Recycline**, Cambridge, MA; and **Western Bronze**, West Springfield, MA.

- **Workshops**

*ReTAP Tool Kit*, was a hands-on, interactive workshop designed to bring together professionals involved in manufacturing extension, business development and recycling in Massachusetts and provide them with the tools to design and implement recycling technology assistance programs for small and medium-sized manufacturers. Over 40 participants from more than 20 agencies attended the workshop and received this valuable information.

In cooperation with the Northeast Recycling Council, the Chelsea Center, the Massachusetts Office of Business Development, and the Department of Environmental Protection, hosted *Fostering Economic Development through Recycling*, with over 40 attendees from the State's economic development and finance communities.

In addition, The Chelsea Center also conducted a workshop on manufacturing with recyclables at the 1996 New England Environmental Expo. The workshop outlined problems manufacturers have faced in obtaining financing and available resources to assist and increase the utilization of scrap materials.



# STEP

## • **Plastics Conversion Program**

This project, initiated with the Massachusetts Department of Environmental Protection and the Massachusetts Manufacturing Partnership (MMP), was designed to help manufacturers in the state who use virgin plastic resin incorporate recycled plastic into their feedstock.

The project works with selected product manufacturers in Massachusetts to determine the appropriate amounts and kinds of scrap plastics for the manufacturing process and final product. Three companies, **GT Machine**, Boxford, MA; **Recycline**, Cambridge, MA, and **Sheltech**, Haverhill, MA, have participated and already benefited from this program.

## • **Research**

The Chelsea Center, working with Dr. Steven McCarthy and Dr. Richard Farrell at UMass-Lowell, are testing several types of bags that claim to be biodegradable. If these bags are biodegradable, they can be used to collect food and yard waste as part of the composting process. Other applications for biodegradable products will be explored, including agricultural uses, such as mulch and weed suppression.

Spearhead by Dr. Robert Malloy of UMass Lowell Plastics Engineering Department, research has been conducted on the use of recycled plastic material in plastic lumber applications. A Plastic Lumber Trade Association (PLTA) has been formed and is actively working with the American Society of Testing and Materials (ASTM) to develop property standards, test protocols, and utilization guidelines for

## Next Steps

The partners in STEP will continue to develop and refine their approach for bringing commercial enviro-technology to the marketplace during the coming year. We intend to focus our efforts in four areas which represent a confluence of EOE's top environmental concerns, DED's business and economic priorities, and the University of Massachusetts' R & D capacity. These are:

- Cleaner manufacturing, including process design, solvent substitution, work environment design, and strategic environmental management;
- Water and wastewater treatment, including drinking water purification techniques, treatment of metals and other waste water, and hazardous waste management;
- Materials development and reuse, including fibers, polymers and biodegradable plastics; and
- Energy conservation and renewable energy.

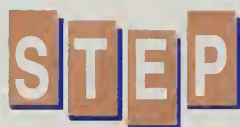
STEP plans a Forum on Environmental Technology in 1997 in order to develop a specific list of activities where the university, the state and the private sector can collaboratively make an impact in 1997 and beyond.



## STEP

## Companies Assisted in 1996

AirXpert Systems, Lexington, MA  
 Ariaon Technologies, Cambridge, MA  
 Atlantic Applied Research Corp.,  
 Burlington, MA  
 AWT Bioclere, New Bedford, MA  
 Bell Sea Marine Systems, Holbrook, MA  
 Bert Engineering, Springfield, NJ  
 Blue Star Technologies, Newton, MA  
 Brittany Dyeing and Printing Corp.,  
 New Bedford, MA  
 C&M Industries, West Falmouth, MA  
 Caldwell, Acton, MA  
 Cellini Purification Systems, Ludlow, MA  
 CFAST/Walt, Medford, MA  
 Chand Kare Technical Ceramics,  
 Worcester, MA  
 ChemDesign, Fitchburg, MA  
 Clairol, Stamford, CT  
 Clivus New England, North Andover, MA  
 Conserve Resources, Centerville, VA  
 Cypress Polymers, Franklin, MA  
 Deerfield Controls, Greenville, MA  
 Dike Corporation, Stoneham, MA  
 Eco Energy, Matapoisett, MA  
 Environmental Engineering  
 Consultants, Whitman, MA  
 Environmental Management Technologies,  
 Milton, MA  
 Environmental Thermal Oxidizers,  
 N.Kingston, RI  
 Energy Transition Technology,  
 N. Andover, MA  
 Erikson Matis, Winthrop, MA  
 Filter Clean, Boston, MA  
 Funn and Frolic, Edgartown, MA  
 Gasco, Warwick, MA  
 Globe Manufacturing Company,  
 Fall River, MA  
 Globe Rubber Works, Rockland, MA  
 GT Machines, Boxford, MA  
 Guardian, Kent, CT  
 Helene Curtis, Rolling Meadows, IL  
 ImageX, Framingham, MA  
 Institute for Self Active Education,  
 Jamaica Plain, MA  
 Ion Signature Technology, Concord, MA  
 JAMCorp, Brighton, MA  
 KAI Science and Technology,  
 Northampton, MA  
 KSE, Amherst  
 Lightning Environmental Recovery  
 Systems, Worcester, MA  
 MODEC, Waltham, MA  
 Moltek, Webster, MA  
 MRC Bearings, Jamestown, NY  
 Norton Company, Worcester, MA  
 ORS/Sippican, Fairhaven, MA  
 (The) Paper People, Westfield, MA  
 Polaroid Corporation, Waltham, MA  
 Puritan Water Corporation, Plymouth, MA  
 Quadral, Clarksburg, MD  
 Recycline, Cambridge, MA  
 SeaMat, Dedham, MA  
 Second Wind, Somerville, MA  
 SepMass, Wareham, MA  
 Sheltech, Haverhill, MA  
 Solmetex, Billerica, MA  
 Solviva, Vineyard Haven, MA  
 TF Purifier, Boynton Beach, FL  
 Thermatrix Inc., San Jose, CA  
 Thermofibergen, Waltham, MA  
 Thermotrex, Waltham, MA  
 Total Municipal Solids Recovery,  
 Lenox, MA  
 Tougher Industries, Albany, NY  
 Twin Rivers Technologies, Quincy, MA  
 United Technologies Research Center,  
 E. Hartford, CT  
 Urban Contamination, Newton, MA  
 Western Bronze, W. Springfield, MA



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